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IS 10748 (2004): Hot-rolled Steel Strip for Welded Tubes and Pipes [MTD 4: Wrought Steel Products]



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वेल्डिड ट्यूब एवं पाइपों के लिए तप्त-बेल्लित
इस्पात की पत्तियाँ — विशिष्टि
(दूसरा पुनरीक्षण)

Indian Standard
HOT-ROLLED STEEL STRIP FOR WELDED
TUBES AND PIPES — SPECIFICATION
(*Second Revision*)

ICS 77.140.50

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Wrought Steel Products Sectional Committee had been approved by the Metallurgical Engineering Division Council.

This standard was first published in 1984 subsequently revised in 1995. While reviewing the standard in the light of experience gained during these years, the Committee decided to revise it to bring it in line with the present practices followed by the Indian industry.

In this revision following changes have been made:

- a) All the four amendments issued have been incorporated; and
- b) Clause on reference of Indian Standard has been modified.

The composition of the Committee responsible for the formulation of this standard is given in Annex A.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

AMENDMENT No. 1 NOVEMBER 2012
TO
IS 10748 : 2004 HOT-ROLLED STEEL STRIP FOR
WELDED TUBES AND PIPES — SPECIFICATION

(Second Revision)

[Page 2, Table 1] — Insert the following at the end of table:

(1)	(2)	(3)	(4)	(5)	(6)
6	0.25	1.50	0.040	0.040	0.45

[Page 3, Table 3] — Insert the following at the end of table:

(1)	(2)	(3)	(4)	(5)
6	490	355	15	3t

(MTD 4)

Reprography Unit, BIS, New Delhi, India

Indian Standard

HOT-ROLLED STEEL STRIP FOR WELDED TUBES AND PIPES — SPECIFICATION

(*Second Revision*)

1 SCOPE

This standard covers requirements for weldable quality hot-rolled carbon steel strip in coils intended for the manufacture of welded steel tubes and pipes.

2 REFERENCES

The standards listed below contain provisions, which through reference in this text constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

<i>IS No.</i>	<i>Title</i>
228 (Relevant Parts)	Method for chemical analysis of steel
1079 : 1994	Hot-rolled carbon steel sheets and strips — Specification (<i>fifth revision</i>)
1599 : 1985	Method for bend test (<i>second revision</i>)
1608 : 1995	Mechanical testing of metals — Tensile testing (<i>second revision</i>)
1730 : 1989	Dimensions for steel plates, sheets, strips and flats for general engineering purposes (<i>second revision</i>)
1852 : 1985	Rolling and cutting tolerances for hot-rolled steel products (<i>fourth revision</i>)
1956 (Part 4):1975	Glossary of terms relating to iron and steel: Part 4 Steel sheet and strip (<i>first revision</i>)
3803 (Part 1):1989	Steel — Conversion of elongation values: Part 1 Carbon and low alloy steels (<i>second revision</i>)
8910 : 1978	General technical delivery requirements for steel and steel products

3 TERMINOLOGY

For the purpose of this standard, the following definitions in addition to those given in IS 1956 (Part 4) shall apply.

3.1 Micro-Alloying Elements

Elements, such as niobium, vanadium and titanium added singly or in combination to obtain higher strength levels combined with better formability, weldability and toughness as compared with non-alloyed steel produced to equivalent strength levels.

3.2 Coil

A rolled flat strip product which is wound into regularly superimposed laps so as to form a coil with almost flat side. It shall have at least 50 laps.

3.3 Hot-Rolled Steel Strip in Coils

A product obtained by rolling heated steel through a semi continuous/continuous-type or reversing strip mill to the required sheet thickness. The product has a surface covered with oxide or scale resulting from the hot rolling operation.

4 SUPPLY OF MATERIAL

4.1 General requirements relating to the supply of hot-rolled steel strip shall conform to IS 8910.

4.2 The material may be ordered on any of the following basis as agreed to between the manufacturer and the purchaser:

- a) Chemical composition, or
- b) Chemical composition and physical properties.

5 GRADES

There shall be five grades of hot-rolled carbon steel strip designated as Grade 1, Grade 2, Grade 3, Grade 4 and Grade 5.

6 MANUFACTURE

6.1 The processes used in making steel and in manufacturing hot-rolled steel strip shall be left to the discretion of the manufacturer.

6.2 Steel shall be supplied in the filled, semi-killed or rimming condition subject to agreement between the manufacturer and the purchaser.

7 CHEMICAL COMPOSITION

7.1 Ladle Analysis

Ladle analysis of the material when carried out either by the method specified in the relevant parts of IS 228 or any other established instrumental/chemical method shall be as given in Table 1. In case of dispute, the procedure given in IS 228 and its relevant parts shall be referee method. However, where the method is not given in IS 228 or its relevant parts, the referee method shall be as agreed to between the purchaser and the manufacturer.

7.2 Product Analysis

Permissible variations in the case of product analysis from the limits specified in Table 1 shall be as given in Table 2.

8 TENSILE TEST

8.1 Number of Tensile Tests

Number of samples to be tested from a cast/heat of one thickness shall be as follows:

- For cast/heat size up to 100 tonnes – 2 samples.
- For cast size between 100-200 tonnes – 3 samples.
- For cast size over 200 tonnes – 4 samples.

Table 1 Chemical Composition

(Clauses 7.1 and 7.2)

Grade	Constituent, Percent, <i>Max</i>				Carbon Equivalent (CE), <i>Max</i>
	Carbon	Manganese	Sulphur	Phosphorus	
(1)	(2)	(3)	(4)	(5)	(6)
1	0.10	0.50	0.040	0.040	—
2	0.12	0.60	0.040	0.040	—
3	0.16	1.20	0.040	0.040	—
4	0.20	1.30	0.040	0.040	0.45
5	0.25	1.30	0.040	0.040	0.45

NOTES

1 CE based on ladle analysis = $C + \frac{Mn}{6} + \frac{Cr+Mo+V}{5} + \frac{Ni+Cu}{15}$

2 For semi-killed quality, silicon content shall be 0.08 percent, maximum.

3 When the steel is killed by aluminium alone, the total aluminium content shall not be less than 0.02 percent. When the steel is killed by silicon alone, the silicon content shall not be less than 0.10 percent. When the steel is silicon-aluminium killed, the silicon content shall not be less than 0.03 percent and total aluminium content shall not be less than 0.01 percent.

4 Micro-alloying may be allowed subject to mutual agreement between the purchaser and the supplier. Micro-alloying elements like Nb, V or Ti, when used individually or in combination, the total content shall not exceed 0.20 percent.

5 Nitrogen content of steel shall not exceed 0.012 percent, which shall be ensured by the manufacturer by occasional check analysis.

6 Closer limits of composition may be agreed to between the supplier and the purchaser.

Table 2 Permissible Variation for Product Analysis

(Clause 7.2)

Constituent	Variation Over Specified Limit, Percent, <i>Max</i>
(1)	(2)
Carbon	0.02
Manganese	0.04
Sulphur	0.005
Phosphorus	0.005
Silicon	0.005

NOTE — Product analysis shall not be applicable to rimming steel.

8.2 Tensile Test Pieces

Tensile test samples shall be taken transverse to the direction of rolling, but for strips below 600 mm width, longitudinal test pieces may be taken. The sample for tensile test shall be from the end of the coil after coiling.

8.3 The tensile test shall be carried out in accordance with IS 1608 as applicable, generally using a proportion gauge length $L_0 = 5.65 \sqrt{S_0}$ where S_0 is the cross-sectional area of the test piece. Test pieces with a non-proportional gauge length may be used; in this case the elongation values shall be converted in accordance with IS 3803 (Part 1). The tensile strength, yield stress percentage elongation shall be as given in Table 3.

8.3.1 Should a test piece break outside the middle half of its gauge length and the percentage elongation obtained is less than the specified, the test may be discarded at the option of the manufacturer and another test made from the sample selected representing the same cast and batch.

9 BEND TEST

9.1 Number of Bend Tests

One bend test shall be tested per cast per thickness.

9.2 Bend test shall be carried out in accordance with IS 1599.

9.2.1 Bend test sample shall be taken transverse to the direction of rolling.

9.2.2 The test piece shall be 75 mm long and 25 mm wide for thickness less than 3 mm and not less than 40 mm wide for 3 mm and other. For small sizes the maximum width available shall be used.

9.2.3 The edge of the bend test piece shall be free from burrs. Filing or machining to remove burrs is permissible.

9.2.4 The test piece shall be bend cold through 180°. The internal diameter of the bend for the different grades of material shall be as given in Table 3. The test piece shall be deemed to have passed the test, if the outer convex surface is free from cracks.

10 RETESTS

Should any one of the test pieces first selected fail to pass any of the tests specified in this standard two further samples shall be selected from the same lot for testing in respect of each failure. Should the test pieces from both these additional samples pass the material represented by the test, samples shall be deemed to comply with the requirement of that particular test. Should the test pieces from either of

Table 3 Tensile Properties

(Clauses 8.3 and 9.2.4)

Grade	Tensile Strength, Min MPa	Yield Stress, Min MPa	Percentage Elongation, Minimum at Gauge Length $5.65 \sqrt{S_0}$	Internal Diameter of Bend
(1)	(2)	(3)	(4)	(5)
1	290	170	30	t
2	330	210	28	$2t$
3	410	240	25	$2t$
4	430	275	20	$3t$
5	490	310	15	$3t$

NOTES

1 t = Nominal thickness of the test piece.

2 1 MPa = 1 N/mm² = 0.1020 kgf/mm².

3 Mechanical properties other than those specified in this table may be as per agreement between the purchaser and the manufacturer for specific applications.

these additional test samples fail, the material represented by the test samples shall be deemed as not conforming to the standard.

11 FREEDOM FROM DEFECTS

The steel shall be free from such segregation, lamination, surface flaws and other defects, which are detrimental to subsequent processing and ultimate use.

NOTE — As internal surface of coils is not amenable to inspection, some surface defects may be expected to be found during slitting. The purchaser in his assessment of the material shall take this into account. The amount of defects liable for rejection shall be mutually agreed between the purchaser and the supplier.

12 DIMENSIONS

Nominal dimensions and thickness of hot-rolled steel strip may be as specified in IS 1730. Sizes other than those specified in IS 1730 may also be supplied by mutual agreement between the purchaser and the manufacturer.

13 TOLERANCES

13.1 Tolerances on thickness and width shall conform to IS 1852.

13.2 Tolerance on edge camber shall be as specified in IS 1079.

13.3 Tolerances closer than those specified in **13.1** and **13.2** on the dimensions of hot-rolled steel strip may also be agreed between the purchaser and the supplier.

14 COIL MASS AND DIAMETERS

The limits of mass outside diameter and internal diameter of the coils shall be agreed to between the manufacturer and the purchaser.

15 CONDITION OF COILS

15.1 The edges may be mill edges or slit edges as agreed between the supplier and the purchaser. When mill edges are specified the depth of defects shall be within 5 mm from the edges on either side of the coil.

15.2 The material shall be in as-rolled condition without any skin passing, pickling, oiling, blast cleaning, annealing and normalizing unless otherwise specified by the purchaser.

15.3 Outer end of the coil may be cropped, if agreed by the manufacturer and the purchaser. There should be no folding of ends in the packed coils. In case the material is supplied without cropping, fish tail length should not be more than 0.5 m.

15.4 The coils shall be suitably packed, so that they do not get damaged during transit.

15.5 Telescopicity in the coils should not be more than 100 mm.

16 MARKING

16.1 Every coil shall be legibly marked outside or inside with the following:

- a) Name or trade-mark of the manufacturer,
- b) Grade of steel,
- c) Cast or identification mark,
- d) Size, and
- e) Mass of coils.

NOTE — For strip below 600 mm width, marking of mass may not be necessary.

16.2 BIS Certification Marking

The material may also be marked with the Standard Mark.

16.2.1 The use of Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

ANNEX A

(Foreword)

COMMITTEE COMPOSITION

Wrought Steel Products Sectional Committee, MTD 4

<i>Organization</i>	<i>Representative(s)</i>
The Tata Iron and Steel Co Ltd, Jamshedpur	DR T. MUKHERJEE (<i>Chairman</i>)
All India Induction Furnace Association of India, New Delhi	SHRI R. P. VARSHNEY
Bharat Heavy Electicals Ltd, Bhopal /Haridwar	SHRI R. K. SETH SHRI K. K. GUPTA (<i>Alternate</i>)
Central Boilers Board (DIPP), New Delhi	SHRI V. K. GOEL SHRI M. L. AHUIA (<i>Alternate</i>)
Consumer Protection Council, Rourkela	SHRI B. VAIDYNATHAN
Convetry Coil-O-Matic (Haryana) Ltd, Riwari	SHRI R. D. B. SINGH SHRI DEVINDER KUMAR (<i>Alternate</i>)
Directorate General of Supplies and Disposals, New Delhi	SHRI S. K. GANGULY SHRI B. S. RANA (<i>Alternate</i>)
Escorts R & D Centre, Faridabad	SHRI ALOK NAYAR
EBG India (P) Ltd, Nashik	SHRI R. PRABHAKAR SHRI KAPIL KAPOOR (<i>Alternate</i>)
Institute of Steel Development and Growth, Kolkata	DR S. R. MEDIRATTA SHRI JAYANATA KUMAR SAHA (<i>Alternate</i>)
Ispat Industries Ltd, Dolvi	SHRI ARVIND J. BHIDE SHRI P. U. C. AYYER (<i>Alternate</i>)
Jindal Iron Steel Co Ltd, Vasind, Thane	SHRI M. K. MAHESHWARI SHRI A. K. MISHRA (<i>Alternate</i>)
Jindal Vijaynagar Steel Co Ltd, Vijaynagar	DR S. K. GUPTA SHRI S. K. HEGDE (<i>Alternate</i>)
M. N. Dastur and Co Ltd, Kolkata	SHRI BHASKAR ROY SHRI SUBHABRATA SENGUPTA (<i>Alternate</i>)
Ministry of Defence (DGQA), Ishapore	JOINT CONTROLLER (CQA MET) SQA (METALS) (<i>Alternate</i>)
Ministry of Defence (OFB), Kolkata	REPRESENTATIVE
Ministry of Railways, RDSO, Lucknow	JOINT DIRECTOR (CHEMICAL) JOINT DIRECTOR (I & L) (<i>Alternate I</i>) DEPUTY DIRECTOR (MET-3) (<i>Alternate II</i>)
Ministry of Steel, New Delhi	SHRI S. S. SAHA SHRI A. C. R. DAS (<i>Alternate</i>)
Mukand Ltd, Thane	SHRI C. H. SHARMA SHRI K. R. SRINIVASAN (<i>Alternate</i>)
National Metallurgical Laboratory, Jamshedpur	DR S. TARAFDAR SHRI R. GOPALKRISHAN (<i>Alternate</i>)
Rashtriya Ispat Nigam Ltd (VSP), Visakhapatnam	SHRI G. TIWARI
SAIL, Bhilai Steel Plant, Bhilai	SHRI D. B. SRIVASTAVA SHRI K. K. KUMAR (<i>Alternate</i>)
SAIL, Bokaro Steel Plant, Bokaro	SHRI A. S. MATHUR SHRI G. B. PRADHAN (<i>Alternate</i>)
SAIL, Central Marketing Organization, Kolkata	SHRI A. K. CHAUDHURI SHRI B. V. S. PANDIT (<i>Alternate</i>)

<i>Organization</i>	<i>Representative(s)</i>
SAIL, Durgapur Steel Plant, Durgapur	REPRESENTATIVE
SAIL, Rourkela Steel Plant, Rourkela	DR SANAK MISHRA SHRI N. K. SOOD (<i>Alternate</i>)
SAIL, R & D Centre for Iron and Steel, Ranchi	SHRI SUDHAKAR JHA DR B. K. PANIGRAHI (<i>Alternate</i>)
Steel Furnace Association of India, New Delhi	SHRI M. S. UNNINAYAR
Steel Re-rolling Mills Association, Mandi Gobind Garh/Delhi	SHRI R. P. BHATIA SHRI H. D. KHERA (<i>Alternate</i>)
Sunflag Iron and Steel Co Ltd, Faridabad/Bhandara	SHRI R. K. MALHOTRA SHRI R. K. VERMA (<i>Alternate</i>)
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Joint Director (MTD), BIS

Flat Steel Products Subcommittee, MTD 4 : 3

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SAIL, Salem Steel Plant, Salem	SHRI S. SISODIA SHRI H. K. ARORA (<i>Alternate</i>)
Tin Plate Company of India Ltd, Jamshedpur	SHRI T. K. GHOSH SHRI A. K. GHOSH (<i>Alternate</i>)
Verny Containers Ltd, Hyderabad	SHRI P. K. MATHUR

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